## REMARKS

I. Status of the Claims

Claims 1-17 are pending in this application, of which Claims 1 and 7 are in independent form. Claims 1 and 7 have been amended to define still more clearly what Applicant regards as his invention. No new matter has been added.

II. Election/Restriction

Applicant has elected the claims drawn to a ballistic material, for prosecution on the merits. Claims 18-28, drawn to methods of making, have been cancelled without prejudice, pursuant to a restriction requirement, and applicants reserve the right to prosecute claims directed to the method in a divisional application, or in the appropriate circumstances, to request rejoinder.

III. The Claimed Subject Matter

In the present invention, there are at least two layers needlepunched together to make the ballistic fabric: (1) a woven layer (which includes unidirectional or non-unidirectional fabric) and (2) a nonwoven batting layer. In the present specification, the term "woven" includes woven, unidirectional and quasi-unidirectional fabrics. This is in explicit definitional format (See, e.g., paras. [0009], [0029]). The nonwoven layer on the other hand is described throughout the specification as a needled layer or a batting material. This is described at paragraph [0023] where it states the nonwoven layer is prepared by "needling," and in paragraph [0018] where the nonwoven layer is referred to as "batting material." As is clear from the context, "nonwoven" in this application was

never intended to refer to a unidirectional material. Independent claims 1 and 7 have been amended to recite a nonwoven batting layer, further clarifying the type of nonwoven material is being described. Thus, the claimed nonwoven layer cannot be unidirectional or quasi-unidirectional fabric.

The end result of combining woven and nonwoven layers by needlepunching represents an advancement in the design and manufacture of high-performance ballistic materials. On one hand, introducing fibers into the interstices of the woven, unidirectional or quasi-unidirectional material by needlepunching increases the interlaminar shear strength as well as the communication between layers, thus providing better absorption and distribution of energy during a ballistic event. See para. [0028] of the published application. On the other hand, the manufacture by needlepunching also permits forming of lower weight, more flexible, and more comfortable ballistic garments, simplifying manufacture of end products by eliminating the need to assemble individual layers. See para. [0031] of the published application.

II. Rejections Over Prior Art Under 35 U.S.C. § 103(a)

Claims 1, 2, 4-10, 13 and 17 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,660,913 ("Coppage") in view of Published U.S. Application No. 2003/00222583 A1 ("Thomas"); Claims 3, 11, 12 and 16 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Coppage in view of Thomas, and further in view of U.S. Patent 6,266,819 ("Bachner"); and Claims 14 and 15 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Coppage in view of Thomas, and further in view of U.S. Patent No. 5,440,965 ("Cordova").

The Examiner relies on Coppage as a disclosure of the use of resin to bond sublayers of a ballistic material. The Examiner relies on Thomas as teaching the manufacture of ballistic material using needlepunching rather than chemical bonders. The Examiner further relies on Thomas as disclosing that needlepunching may be used to reduce fabric thickness while increasing density. The Examiner then concludes that, taken together, Coppage and Thomas render obvious a multilayered ballistic material held together using needlepunching.

However, there are several important differences between the claimed invention and the prior art. Coppage discloses a three-layered material comprising a woven middle layer and "non-woven" inner and outer layers (Column 3, 14-18). The inner and outer nonwoven layers are made up of individual sublayers of substantially unidirectional nonwoven ballistic fibers bonded together with resin (Column 3, 20-23). The middle woven layer is composed of individual sublayers that are not quilted or otherwise joined to each other (Column 3, 47-51). Importantly, the "nonwoven" layers used in Coppage refer to a unidirectional tow layer comprised of multifilament tows placed or bonded with resin against woven fabric layers. These layers are in no way, shape or form equivalent to a batting layer, as claimed.[1] Because Coppage does not disclose bonding of nonwoven batting and woven layers to create ballistic material, it is impossible, even with the addition of Thomas, to arrive at the claimed invention.

Thomas teaches needlepunching to make a ballistic fabric, but does not disclose the use of woven, quasiunidirectional, cross-laid, or unidirectional fabrics in

[1] A batting is defined in one online textile dictionary as a "soft, bulky assembly of fibers, usually carded...." (available at http://www.celaneseacetate.com/textile_glossary_filament_acetate.pdf) (2001) (copy attached).

combination with the needlepunched material. Nonwoven felts, such as described in Thomas, have not been widely accepted as viable ballistic materials for law enforcement and military vests. This is due to the fact that the backface signature (deformation) of the felt alone is unacceptable, and the bulk of fibers that must be used in a felt to achieve the ballistic performance of woven layers has been perceived as being too great.

Multiple functional layers of resin bonded ballistic layers, either as woven or unidirectional tows, have been used with great success. However, needlepunching these layers is generally not possible due to the thermoplastic materials (films) or liquid resins that would foul the barbs of the needles causing catastrophic failure of the needles (breakage).

It is known that needlepunching will typically degrade the tows due to the shearing action of the barbs perpendicular to the plane of the tows. This does not happen in the process developed by the present inventors, due to the fact that the batting layer is used as a scaffold, and the sharp barbs of the needles cannot damage the tows because they are filled with fiber by the time they reach the tows. This allows the staple fibers to be inserted in the woven/unidirectional tow system with virtually no damage to the high strength ballistic tows.

Thus, while Thomas discloses a needlepunched ballistic material, the reference does not disclose a method of intimately combining needlepunched batting and standard (woven or unidirectional) materials. Moreover, the claimed combination is not obvious, at least because the preferred resin-bonded material of the prior art cannot be readily needlepunched, without adding the batting layer as presently claimed.

Turning to the dependent claims and secondary references, the Examiner has asserted that the backface signature is an inherent property of a material made according to Coppage in view of Thomas. To address this point specifically, as set forth above, the combination of Coppage and Thomas does not result in a combination of a nonwoven batting layer needlepunched together with a woven, cross laid or unidirectional material. Therefore, the properties of the resulting material according to the invention would not be an "inherent property" found in the prior art.

Moreover, the reduced backface signature in a material comprising needle felted components is surprising. Note that Thomas, while publishing and claiming V50 values, says virtually nothing about backface signature. This is presumably because the improvement in backface signature (as a function of how much material is used) is not expected in a felted material. In contrast, in the present Table 1 at para. [0046] of the published application, backface signature in a core material according to the invention is shown to be significantly improved as compared to results obtained with quasiunidirectional materials alone, for fabrics having the same density.

While Bachner discloses certain high performance ballistic fibers used in connection with the present invention, Bachner does not teach that such fibers may be needled into the interstices of a woven ballistic fabric by needlepunching a batting layer and a woven layer together. Thus, the secondary reference fails to overcome the deficiencies of the base rejection, Coppage in view of Thomas.

Cordova, likewise, is alleged to show alternatives to woven fabrics. The reference is devoid of any teaching that the ballistic characteristics of such fabrics may be

improved by needling in a nonwoven batting layer, and this reference also fails to overcome the deficiencies of Coppage and Thomas.

The other claims in this application are each dependent from one or another of the independent claims discussed above and are therefore believed patentable for the same reasons. Since each dependent claim is also deemed to define an additional aspect of the invention, however, the individual reconsideration of the patentability of each on its own merits is respectfully requested.

In view of the foregoing it is believed that all of the claims, as amended, are allowable over the prior art of record, and a Notice of Allowance is respectfully requested.

Applicants' undersigned attorney may be reached in our New York office by telephone at (212) 218-2100. All correspondence should continue to be directed to our address given below.

Respectfully submitted,

Brendan Mee
Attorney for Applicants
Registration No. 43,391

FITZPATRICK, CELLA, HARPER & SCINTO
30 Rockefeller Plaza
New York, New York 10112-3801
Facsimile: (212) 218-2200

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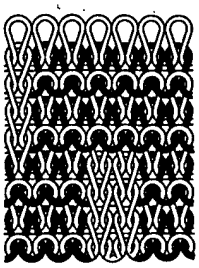
**BASIC DYES:** See DYES.

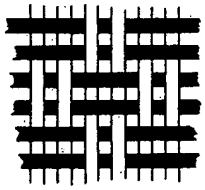
**BASIS WEIGHT:** The weight of a unit area of fabric. Examples are ounces per square yard and grams per square centimeter.

**BASKET STITCH:** In this knit construction, purl and plain loops are combined with a preponderance of purl loops in the pattern courses to give a basket-weave effect.


Basket Stitch

**BASKET WEAVE:** A variation of the plain weave in which two or more warp and filling threads are woven side by side to resemble a plaited basket. Fabrics have a loose construction and a flat appearance and are used for such things as monk's cloth and drapery fabrics.

**BAST FIBER:** Any of certain strong, woody fibers used in making rope, cordage etc.


Basket Weave

**BATHROBE BLANKETING:** A double-faced fabric woven with a tightly twisted spun warp and two sets of soft spun filling yarns. The fabric is thick and warm and its filling yarns are frequently napped to produce a soft surface. Today's blankets are made of spun polyester, acrylic, or polyester/cotton blends.

**BATIK:** See DYES.

**BATISTE:** **1.** A sheer, woven, mercerized fabric of combed cotton or polyester/cotton resembling nainsook, only finer, with a lengthwise streak. **2.** A rayon fabric decorated with dobby woven striped and Jacquard florals. **3.** A smooth, fine, woven fabric, lighter that challis and very similar to nun's veiling.

**BATTING:** A soft, bulky assembly of fibers, usually carded. Battings are sold in sheets or rolls and used for warm interlinings, comforter stuffings, and other thermal or resiliency applications.

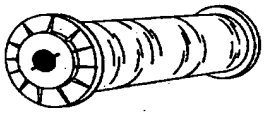
**BAYARDERE:** A very broad term for stripes that run crosswise in a knit or woven fabric.

**BCF YARNS:** Bulked continuous filament yarns for carpet trade, usually nylon, polypropylene, or polyester.

**BEADED SELVAGE:** See LOOPY SELVAGE.

**BEADED VELVET:** Velvet with a cut-out pattern or a velvet pile effect, made on a Jacquard loom. This fabric is used primarily for evening wear.

**BEAM:** A cylinder of wood or metal, usually with a circular flange on each end, on which warp yarns are wound for slashing, weaving, and warp knitting.


Beam

**BEAM DYEING MACHINE:** A machine for dyeing warp yarns or fabrics that have been wound onto a special beam, the barrel of which is evenly perforated with holes. The dye liquor is forced through the yarn or fabric from inside to outside and vice versa.